

CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the present application.

Listing of Claims:

Claim 1 (previously presented): A gallium-nitride semiconductor substrate having a mirrorlike, planar surface directly onto which a light-emitting-device-forming film has been epitaxially grown, the gallium-nitride substrate therein contaminated at the interface between the mirrorlike, planar surface and the device-forming film grown thereon by one or more elements selected from Si, Cr, Mn, Fe, Ni, Cu, Zn and Al at a density level of from 15×10^{10} to 10×10^{11} atoms/cm².

Claim 2 (previously presented): A gallium-nitride semiconductor substrate having a mirrorlike, planar surface directly onto which a light-emitting-device-forming film has been epitaxially grown, the gallium-nitride substrate therein contaminated at the interface between the mirrorlike, planar surface and the device-forming film grown thereon by one or more elements selected from Si, Cr, Mn, Fe, Ni, Cu, Zn and Al at a density level of from 15×10^{10} to 5×10^{11} atoms/cm².

Claim 3 (withdrawn): A method of processing a gallium-nitride semiconductor substrate, the method comprising:

providing a gallium-nitride semiconductor substrate having a complex front side in which the Ga and N faces are exposed in alternation;

polishing the substrate front side with an abrasive embedded into a metallic platen, thereby transforming the substrate episurface into a process-transformed layer;

reactive-ion etching the substrate front side using a halogen plasma to remove the process-transformed layer; and

wet etching the reactive-ion etched substrate, by means of an etchant that is one of $\text{HF} + \text{H}_2\text{O}_2$, $\text{HCl} + \text{H}_2\text{O}_2$, $\text{H}_2\text{SO}_4 + \text{H}_2\text{O}_2$, $\text{HNO}_3 + \text{H}_2\text{O}_2$, $\text{HF} + \text{O}_3$, $\text{HCl} + \text{O}_3$, $\text{H}_2\text{SO}_4 + \text{O}_3$, HNO_3 , or $\text{HNO}_3 + \text{O}_3$, and that has an oxidation-reduction potential of more than 1.2 V, in a room-temperature aqueous solution of pH = 2 to 3, thereby to remove contaminant metal produced by said reactive-ion etching.

Claim 4 (canceled)

Claim 5 (withdrawn): A method of processing a gallium-nitride semiconductor substrate as set forth in claim 3, characterized in that a wash for taking off organic matter by means of an organic solvent, and a wash by means of an alkaline solution in order to take off nonmetal contaminants are carried out either before or after the wet etching.

Claims 6-10 (canceled)

Claim 11 (previously presented): A gallium-nitride semiconductor substrate as set forth in claim 1, wherein the substrate surface on which the device-forming epitaxial film has been grown is a complex of faces in which Ga is exposed, and faces in which N is exposed.

Claim 12 (previously presented): A gallium-nitride semiconductor substrate as set forth in claim 2, wherein the substrate surface on which the device-forming epitaxial film has been grown is a complex of faces in which Ga is exposed, and faces in which N is exposed.

Claims 13 and 14 (canceled)